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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/756,872	01/12/2004	Saad Ahmed Sirohey	135488CT (15163US01)	9393

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EXAMINER

KRASNIC, BERNARD

ART UNIT	PAPER NUMBER
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2609

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/756,872

Applicant(s)

SIROHEY ET AL.

Examiner

Bernard Krasnic

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1-12-2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

2. The abstract of the disclosure is objected to because the phrase "Certain embodiments of the present invention provide" in line 1 is suggested deleted. It is suggested to start the sentence with -- A system and method for displaying a set of data --. Correction is required. See MPEP § 608.01(b).

Claim Objections

3. Claims 1, 4-7, 9, 12-13, 24, 27-30 objected to because of the following informalities:

Claims 1 and 24, line 7 respectively: "display attributes to display" should be -- display attributes to said display --.

Claims 4, 12 and 27, lines 1-2 respectively: "highlighting select display index values" should be -- highlighting select said display index values --.

Claims 5-7, 13 and 28-30, lines 1-2 respectively: "highlighted select display index values" should be -- highlighted select said display index values --.

Claim 9, line 9: "display index values from a first set" should be -- display index values from the first set --.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

4. Claim 24 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 24 is drawn to functional descriptive material NOT claimed as residing on a computer readable medium.

MPEP 2106.IV.B.1(a) (Functional Descriptive Material) states:

"Data structures not claimed as embodied in a computer-readable medium are descriptive material per se and are not statutory because they are not capable of causing functional change in the computer."

"Such claimed data structures do not define any structural or functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure's functionality to be realized."

Claim 24, while defining "A computer executable program for", does not define a "computer-readable medium" and is thus non-statutory for that reasons. A "computer executable program" can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on "computer-readable medium" in order to

make the claim statutory. It is suggested to be -- A computer readable medium encoded with a computer executable program for --.

"In contrast, a claimed computer-readable medium encoded with the data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory." - MPEP 2106.IV.B.1(a)

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 12-15, and 17-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re Claim 12: The limitations "further comprising highlighting select display index values" renders this claim indefinite because it is unclear and improper to have the system in claim 9 be limited by further comprising it with a method of claim 12. It is suggested to be -- further comprising a highlighting unit for highlighting select display index values --.

Claims 13-15 are dependent upon claim 12.

Re Claim 17: The limitation "observing highlighted characteristics" in line 5 is insufficient antecedent basis. It is suggested to be -- observing said selected characteristics -- as mentioned in line 4 of this claim.

Claims 19-23 are dependent upon claim 17.

Re Claim 18: The limitation "said display attributes" in line 2 is insufficient antecedent basis. It is suggested to be -- and said select characteristics -- as mentioned in line 4 of claim 17.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-16 and 24-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida ("Computer-aided diagnosis scheme for detection of polyps at CT Colonography" - Radio Graphics 2002 - 22: pgs. 963-979 - Imaging & Therapeutic

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Technology) in view of Bartroli ("Nonlinear Virtual Colon Unfolding" - IEEE - pages 411-418, Oct. 2001), and further in view of Krishnan et al (US 2004/0013290 A1).

Re Claim 9: Yoshida discloses a system / Scheme for Detection of Polyps (see page 965, Section – Overview of the CAD Scheme) for displaying a set of data with a virtually dissected anatomical structure / colon (see abstract), said system comprising a virtual dissection unit for creating a virtual dissection of the anatomical structure by mapping a first set of data to a second set of data, wherein the second set of data corresponds to the virtual dissection; a computation unit / computation of 3D geometric features unit (see Fig. 1) for computing display index values / shape index and curvedness (see page 969, Section – Detection of Polyp Candidates, paragraph 1, lines 11-13, the first data set is shown in Fig. 2b and after the colon is separated, the 3D geometric features are considered) corresponding to said first set of data; an assignment unit / detection of polyp candidates unit (see Fig. 1) for assigning display attributes / color bar (see page 970, left paragraph starting with "Figure 12 demonstrates ...", the display attributes are the colored classes of the shape index values, Fig. 12 shows this color bar and the display attributes) to said display index values / shape index and curvedness; a mapping unit / hysteresis thresholding unit within the detection of the polyps unit for mapping said display index values / shape index from a first set of data to a third set of data (see page 970, left paragraph starting with "Hysteresis thresholding ...", the thresholding sets the shape index value set into a thresholded shape index value set, Fig. 10 shows a 2D data detection of a polyp after the hysteresis thresholding); an

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overlay unit for organizing said third set of data for display with the virtually dissected anatomical structure.

However, Yoshida fails to disclose or fairly suggest a virtual dissection unit for creating a 2D virtual dissection of the anatomical structure.

Bartoli discloses a virtual dissection unit / nonlinear virtual colon unfolding (see title) for creating a virtual dissection of the anatomical structure / colon or tubular organ (see page 418, last sentence in Section – Conclusion and Future Work) by mapping a first set of data / 3D volume data to a second set of data / 2D unfolded map, wherein the second set of data corresponds to the virtual dissection (see abstract and Section – Conclusion and Future Work).

Bartoli, as recited in claim 16, discloses first set of data is three-dimensional (Yoshida disclosed 3D geometric features are the first set of data as shown in Fig. 1) and said second / 2D unfolded map (see abstract and Section – Conclusion and Future Work) and third sets of data are two-dimensional (Yoshida disclosed in Fig. 10 a 2D data detection of a polyp after the hysteresis thresholding).

Therefore, in view of Bartoli, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yoshida's device by attaching the 2D virtual dissection unit for the overlaying unit in order to provide a different visualization technique to further enhance the polyp detection.

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However Yoshida, as modified by Bartoli, fails to disclose or fairly suggest an overlay unit for organizing said third set of data for display with the virtually dissected anatomical structure.

Krishnan discloses overlay unit / fusion (220) for organizing said third set of data for display with the virtually dissected anatomical structure (see Fig. 2, paragraph [0006], lines 1-3, a fusion combiner combines two 2D data sets to create an enhanced view for a user diagnosis).

Therefore, in view of Krishnan, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Yoshida's device, as modified by Bartoli, by attaching the overlay unit to further enhance the diagnosis and allow a user to view more useful information.

Re Claim 10: Yoshida discloses an anatomical structure is the colon (see abstract).

Re Claim 11: Yoshida discloses the display attribute is color / color bar (see page 970, left paragraph starting with "Figure 12 demonstrates ...", the display attributes are the colored classes of the shape index values, Fig. 12 shows this color bar and the display attributes).

Re Claim 12: Yoshida discloses highlighting / coloring unit within the Detection of Polyp unit select display index values / shape index values according to user input (see page 970, first two left paragraphs starting with "Figure 12 demonstrates ...", the display

attributes are the colored or highlighted classes of the shape index values and the shape classes are specified originally by the user as for example a cap class, the cap class has the shape index values between .9 and 1 as shown in Fig. 10, further shapes are cup, rut, saddle, and ridge).

Re Claim 13: Yoshida discloses highlighted / coloring select display index values / shape index values are shape data (see page 970, first two left paragraphs starting with "Figure 12 demonstrates ...", the display attributes are the colored or highlighted classes of the shape index values, shapes are cap, cup, rut, saddle, and ridge).

Although Yoshida, as modified by Bartoli and Krishnan doesn't specifically disclose, as recited in claim 14 and claim 15, highlighted select display values are fluid data and contrast enhanced fecal matter data, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have such a feature where the select display values are fluid data and contrast enhanced fecal matter data because these data's have there own specific shape, curvedness, and texture values and ranges which a detection could possibly be made for.

As to claims 1-8, they differ from claims 9-16 in that claims 9-16 are toward apparatus claims whereas claims 1-8 are toward method claims. Therefore, all the limitations in claims 1-8 respectively are analyzed and taught by Yoshida, as modified

by Bartroli and Krishnan, in the same manner as Yoshida, as modified by Bartroli and Krishnan, taught claims 9-16 above.

As to claims 24-31, they differ from claims 9-16 in that claims 9-16 are toward apparatus claims whereas claims 24-31 are toward a computer readable medium encoded with a computer executable program as understood. Therefore, all the limitations in claims 24-31 respectively are analyzed and taught by Yoshida, as modified by Bartroli and Krishnan, in the same manner as Yoshida, as modified by Bartroli and Krishnan, taught claims 9-16 above. This analysis is allowed because Yoshida discloses that the system may be run on a computer as imaging software (see Yoshida ref., Section – Introduction, paragraph 3, line 1-3).

9. Claims 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida in view of Bartroli.

Re Claim 17: A method for viewing a virtually dissected anatomical structure, said method comprising instructing the display of a virtual dissection of an anatomical structure; selecting various characteristics / shape index and curvedness of the anatomical structure / colon for enhancement / coloring or highlighting (see page 969, Section – Detection of Polyp Candidates, paragraph 1, lines 11-13, the first data set is shown in Fig. 2b and after the colon is separated, the 3D geometric features are considered); observing highlighted / color bar characteristics / shaped index or

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curvedness and the virtual dissection (see page 970, left paragraph starting with "Figure 12 demonstrates ...", the shape index values or the characteristics are colored based on the classes of the shape index values, Fig. 12 shows this color bar and the display attributes, Fig. 10 shows a 2D data detection of a polyp using coloring or highlighting after the hysteresis thresholding)).

However, Yoshida fails to disclose or fairly suggest that the anatomical structure is a virtual dissection of the anatomical structure.

Bartoli discloses that the anatomical structure is of a virtual dissected anatomical structure (see right side of Fig. 1, abstract).

Bartoli, as recited in claim 18 as understood, discloses displaying said virtual dissection (Bartoli discloses the virtual dissection) and said display attributes (Yoshida discloses the coloring or highlighting of the shape classes on the anatomical structure).

Therefore, in view of Bartoli, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yoshida's device by replacing Yoshida's anatomical colon structure with the virtual dissection structure of a colon in order to provide a different visualization technique to further enhance the polyp detection.

Re Claim 19: Yoshida discloses an anatomical structure is a colon (see abstract).

Re Claim 20: Yoshida discloses the colon has characteristics comprising cup, rut, saddle, ridge, and cap (see Fig. 10).

Re Claim 23: Yoshida discloses the selected characteristic / shaped index values for enhancement / coloring or highlighting comprises shape data / shaped index values (see page 970, first two left paragraphs starting with "Figure 12 demonstrates ...", the shape index classes are colored or highlighted based on the shape index values, shapes are cap, cup, rut, saddle, and ridge).

Although Yoshida as modified by Bartoli doesn't specifically disclose, as recited in claim 21 and claim 22, selected characteristic for enhancement comprises fluid data and contrast enhanced fecal matter data, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have such a feature where the select characteristic for enhancement are fluid data and contrast enhanced fecal matter data because these data's have there own specific shape, curvedness, and texture values and ranges which a detection could possibly be made for.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bohm et al discloses a method for the improved display of co-registered 2D-3D images in medical imaging; Rust discloses an interactive virtual endoscopy; Yoshida et al discloses a method for virtual endoscopic visualization of the

colon by shape-scale signatures, centerlining, and computerized detection masses; Acar et al discloses a method for detection and classifying a structure of interest in medical images; Yoshida et al discloses a method for computer-aided detection of three-dimensional lesions; Lachner et al discloses a method and device for localizing a structure in a measure data set; Chen et al discloses methods and systems for display and analysis of moving arterial tree structures; Kopelman et al discloses a dental image processing method and system; Summers et al discloses a method for segmenting medical images and detecting surface anomalies in anatomical structures; Wang et al discloses a curved cross-section based system and method for gastrointestinal tract unraveling; Renaud discloses a method and device for enabling close investigation of CT colonography inspection; Haker discloses a nondistorting flattening maps and the 3-D visualization of colon CT images; Balogh discloses a virtual dissection of the colon: technique and first experiments with artificial and cadaveric phantoms; Dev discloses an imaging and visualization in medical education.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Krasnic whose telephone number is (571) 270-1357. The examiner can normally be reached on Mon-Thur 8:00am-3:00pm and every other Friday 8:00am-3:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jong-Suk (James) Lee can be reached on (571) 272-7044. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Bernard Krasnic
February 2, 2007



JONG SUK LEE
SUPERVISORY PATENT EXAMINER